of voltaic elements formed of an amalgam of potassium with zinc, copper and platina, a solution of a salt of the negative metal being the interposed liquid, are given; the last combination is one of great electromotive energy, and when a voltameter is interposed in the circuit, it decomposes abundantly the water contained in it. A still more energetic electromotive force is exhibited by a voltaic element, consisting of amalgam of potassium, sulphuric acid, and peroxide of lead. The author then shows, that if three metals be taken in their electromotive order, the electromotive force of a voltaic combination formed of the two extreme metals is equal to the sum of the electromotive forces of the two elements formed of the adjacent metals.

Among the instruments and processes described in the subsequent part of the memoir are the following. 1. An instrument for measuring the resistance of liquids, by which the errors in all previous experiments are eliminated, particularly those resulting from neglecting the contrary electromotive force arising from the decomposition of the liquid. 2. The differential resistance measurer, by means of which the resistances of bodies may be measured in the most accurate manner, however the current employed may vary in its energy. 3. An instrument for ascertaining readily what degree of the galvanometric scale corresponds to half the intensity indicated by any other given degree. 4. A means of employing the same delicate galvanometer to measure currents of every degree of energy, and in all kinds of circuits. 5. Processes to determine the deviations of the needle of a galvanometer corresponding to the degrees of force, and the converse.

4. "On the Organ of Hearing in Crustacea." By Arthur Farre, M.D., F.R.S.

The author finds that in the Lobster (*Astacus marinus*), the organ of hearing consists of a transparent and delicate vestibular sac, which is contained in the base, or first joint of the small antennæ; its situation being indicated externally by a slight dilatation of the joint at this part, and also by the presence of a membrane covering an oval aperture, which is the fenestra ovalis. The inner surface of the sac gives origin to a number of hollow processes, which are covered with minute hairs and filled with granular matter, apparently nervous. A delicate plexus of nerves, formed by the acoustic nerve, which is a separate branch supplied from the supra-œsophageal ganglion, is distributed over the base of these processes and around the sac. Within the sac there are always found a number of particles of siliceous sand, which are admitted, together with a portion of the surrounding water, through a valvular orifice at the mouth of the sac, being there placed apparently for the express purpose of regulating the size of the grains. The author considers these siliceous particles as performing the office of otolites, in the same way as the stones taken into the stomachs of granivorous birds supply the office of gastric teeth. Several modifications of this structure exhibited in the organs of hearing of the *Astacus fluviatilis*, *Pagurus streb-*

lonyx, and *Palinurus quadricornis* are next described, and an explanation attempted of the uses of the several parts and their subserviency to the purposes of that sense.

The author concludes by a description of another organ situated at the base of the large antennæ, which it appears has been confounded with the former by some anatomists, but which the author conjectures may possibly constitute an organ of smell. The paper is accompanied by illustrative drawings.

5. "A statement of Experiments showing that Carbon and Nitrogen are compound bodies, and are made by Plants during their growth." By Robert Rigg, Esq., F.R.S.

The author, finding that sprigs of succulent plants, such as mint, placed in a bottle containing perfectly pure water, and having no communication with the atmosphere except through the medium of water, or mercury and water, in a few weeks grow to more than double their size, with a proportionate increase of weight of all the chemical elements which enter into their composition, is thence disposed to infer that all plants make carbon and nitrogen; and that the quantity made by any plant varies with the circumstances in which it is placed.

6. "Physiological inferences derived from Human and Comparative Anatomy respecting the Origins of the Nerves, the Cerebellum, and the Striated Bodies." By Joseph Swan, Esq. Communicated by Richard Owen, Esq., F.R.S.

The author remarks that those parts of the nervous system which are concerned in motion and in sensation exhibit a great similarity in all vertebrate animals. To the first of these functions belong the anterior and middle portions of the spinal cord and medulla oblongata, including the anterior pyramids, the crura cerebri, and some fibres leading to the corpora striata and the convolutions, and also the cerebellum. To the function of sensation belong the posterior surface of the spinal cord, the posterior and lateral portions of the medulla oblongata, including the posterior pyramids, the ventricular cords, and the fourth and third ventricles.

From a general comparison of the relative magnitude and structure of these several parts in the different classes of vertebrated animals, the author infers that only a very small portion of the brain is necessary for the origins of the nerves, their respective faculties being generally derived near the place at which they leave the brain. These origins are traced in various cases, where, from peculiarities of arrangement or of destination, they present certain remarkable differences of situation.

The author is led to consider the cerebellum as an appendage to the brain, rather than to the medulla oblongata and spinal nerves, for it does not correspond with either the number or the size of the sensitive or motor nerves; and that it is not required for the intellect, for the special senses, for common sensation, or for volition, appears from its size bearing no proportion to the strength of